

**• General Description**

The TF070N04N uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications.

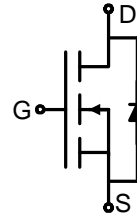
**• Features**

- Advance device constructure
- Low R<sub>DS(ON)</sub> to minimize conduction loss
- Low Gate Charge for fast switching
- Low Thermal resistance

**• Application**

- Synchronous Rectification for AC-DC/DC-DC converter
- Power Tools

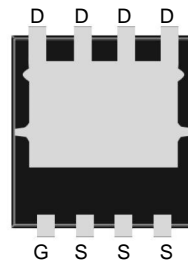
**• Product Summary**



V<sub>DS</sub>=40V I<sub>D</sub>=55A

R<sub>DS(ON)</sub>(10V typ)=6.8mΩ

R<sub>DS(ON)</sub>(4.5V typ)=8.7mΩ



**PDFNWB5x6-8L**

**• Package Marking and Ordering Information:**

Part NO.	TF070N04N
Marking1	070N04N
Marking2	TF:tuofeng; Y:year code; XX:Week; AA:device code;
Basic ordering unit (pcs)	5000

**• Absolute Maximum Ratings (T<sub>C</sub> =25°C)**

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V <sub>DS</sub>	40	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current	I <sub>D@TC=25°C</sub>	55	A
	I <sub>D@TC=75°C</sub>	41	A
	I <sub>D@TC=100°C</sub>	33	A
Pulsed Drain Current ①	I <sub>DM</sub>	180	A
Total Power Dissipation	P <sub>D@TC=25°C</sub>	35	W
Total Power Dissipation	P <sub>D@TA=25°C</sub>	2.0	W
Operating Junction Temperature	T <sub>J</sub>	-55 to 150	°C
Storage Temperature	T <sub>STG</sub>	-55 to 150	°C
Single Pulse Avalanche Energy	E <sub>AS</sub>	45	mJ



●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	$R_{thJC}$	-	-	3.5	° C/W
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	37	° C/W
Soldering temperature, wavesoldering for 8 s	$T_{sold}$	-	-	265	° C

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1.1	1.5	2.1	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 40V, V_{GS} = 0V$	-	-	1.0	$\mu A$
Gate- Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 20A$	-	6.8	8.5	$m\Omega$
		$V_{GS} = 4.5V, I_D = 15A$	-	8.7	11.0	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 25V, I_D = 20A$	-	20	-	S
Source-drain voltage	$V_{SD}$	$I_S = 20A$	-	0.84	1.20	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	$C_{iss}$	$f = 1MHz$ $V_{DS} = 20V$ $V_{GS} = 0V$	-	1366	-	pF
Output capacitance	$C_{oss}$		-	127	-	
Reverse transfer capacitance	$C_{rss}$		-	111	-	

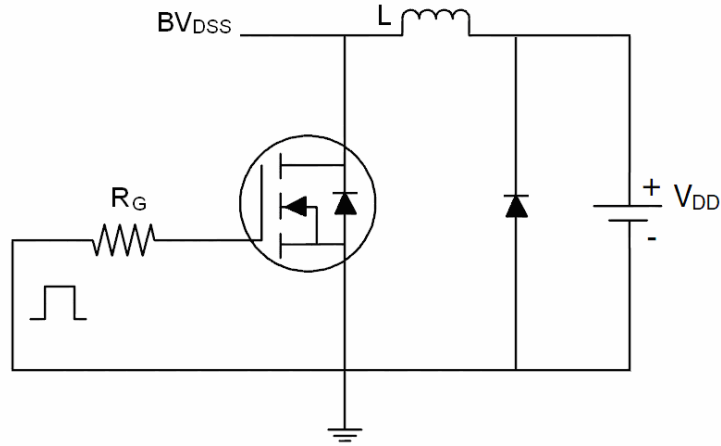
●Gate Charge characteristics( $T_a = 25^\circ C$ )

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	$Q_g$	$V_{DD} = 20V$ $I_D = 20A$ $V_{GS} = 10V$	-	31.3	-	nC
Gate - Source charge	$Q_{gs}$		-	10.8	-	
Gate - Drain charge	$Q_{gd}$		-	3.68	-	

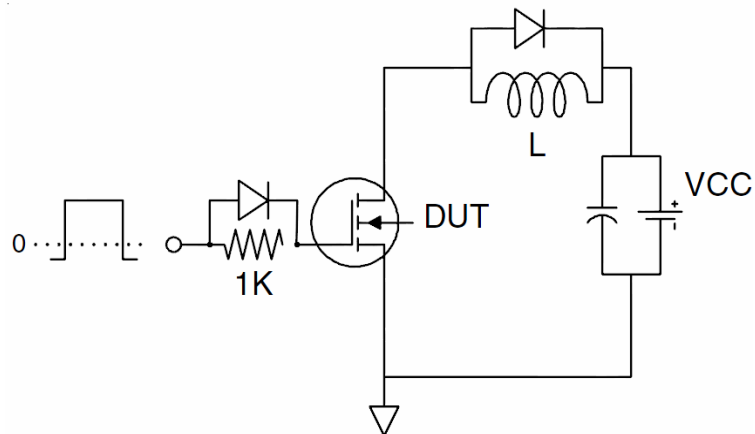
Note: ① Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$  ;

**Test Circuit**

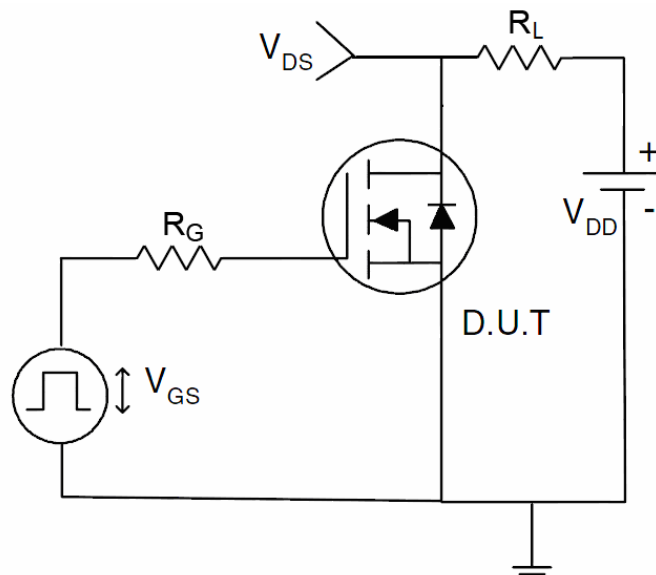
**1)  $E_{AS}$  test Circuit**



**2) Gate charge test Circuit**



**3) Switch Time Test Circuit**



Typical Electrical and Thermal Characteristics

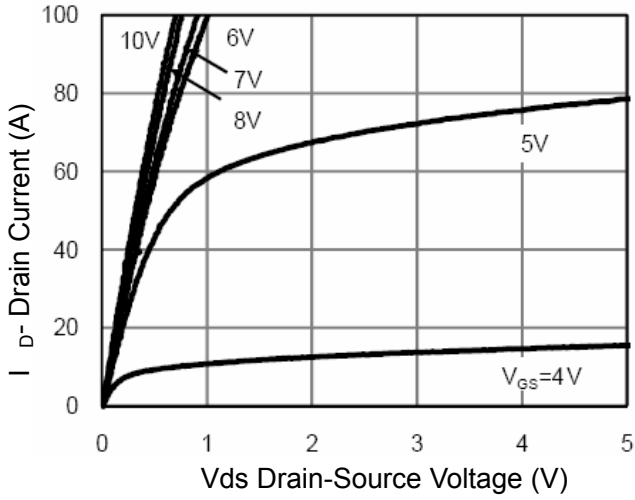


Figure 1 Output Characteristics

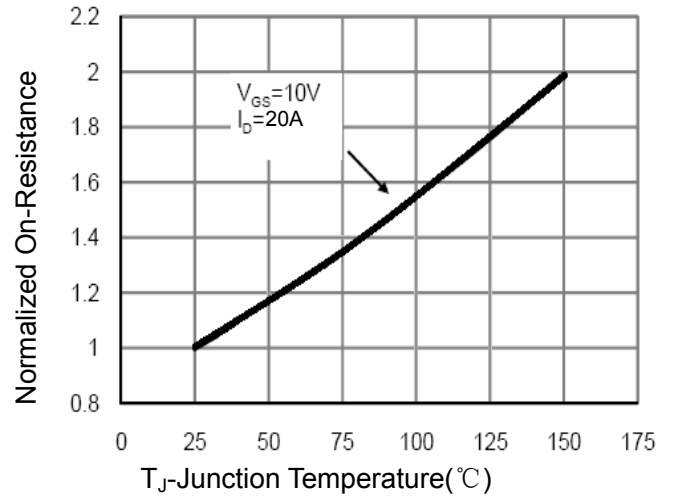


Figure 4 Rds(on)-Junction Temperature

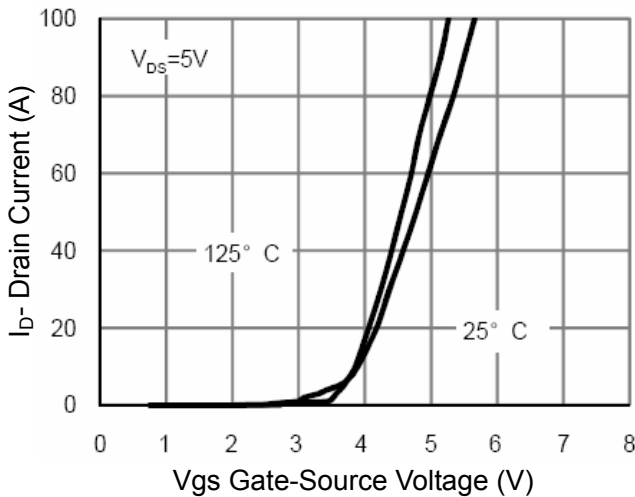


Figure 2 Transfer Characteristics

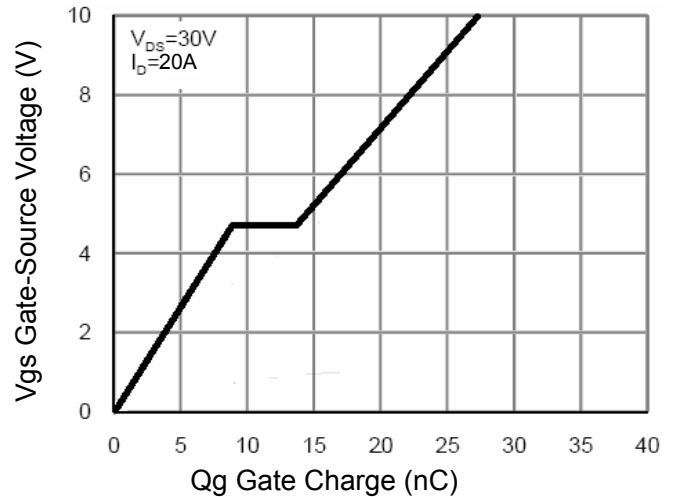


Figure 5 Gate Charge

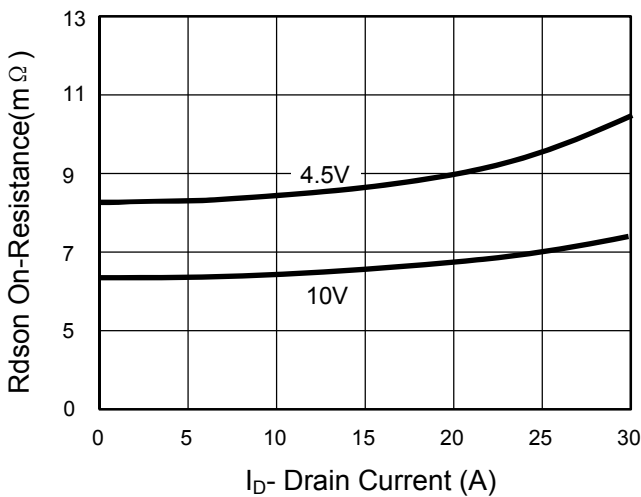


Figure 3 Rds(on)- Drain Current

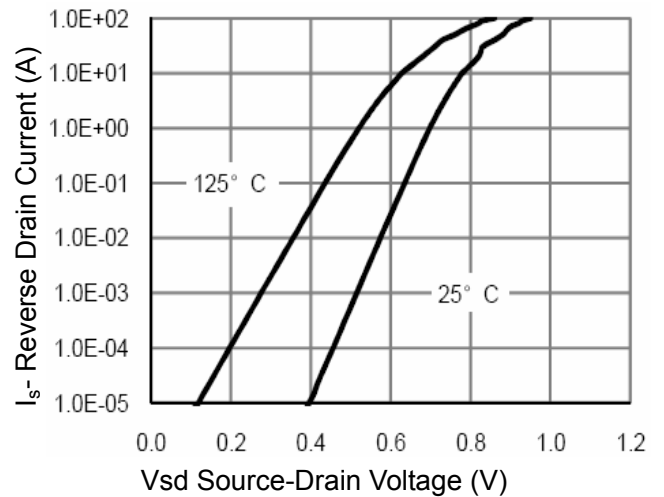


Figure 6 Source- Drain Diode Forward

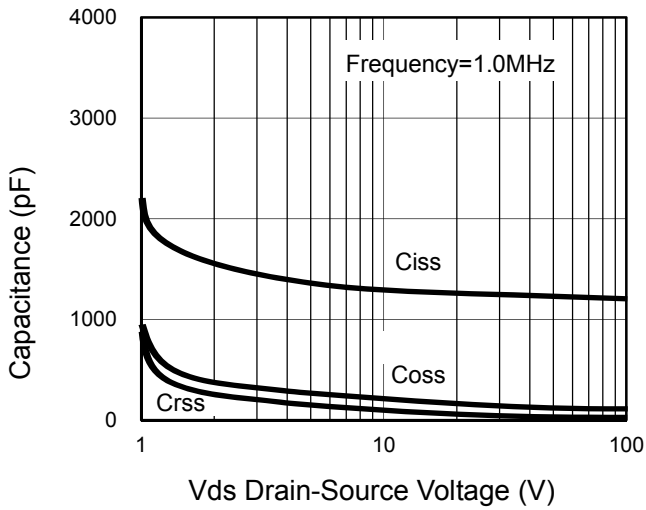


Figure 7 Capacitance vs Vds

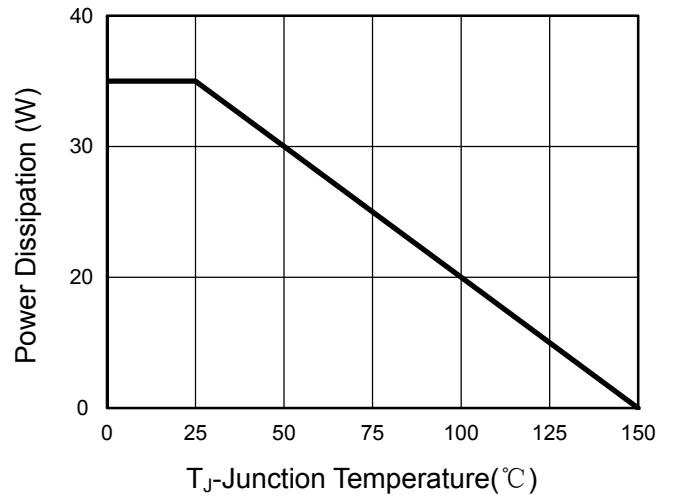


Figure 9 Power De-rating

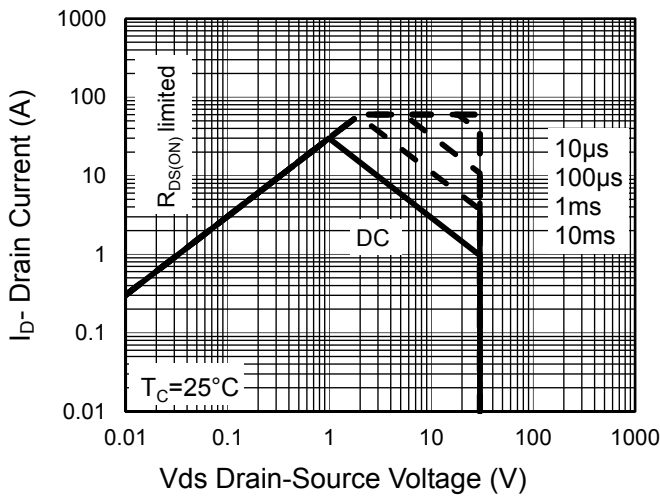


Figure 8 Safe Operation Area

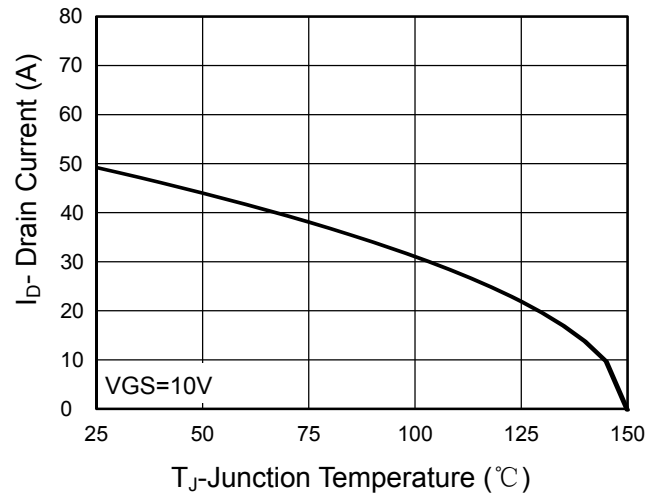


Figure 10 Current De-rating

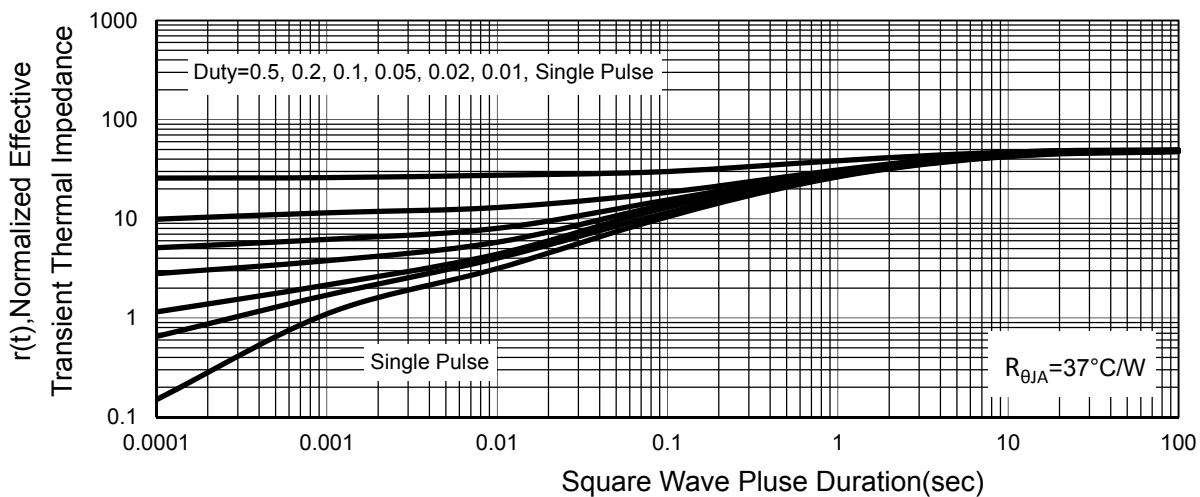
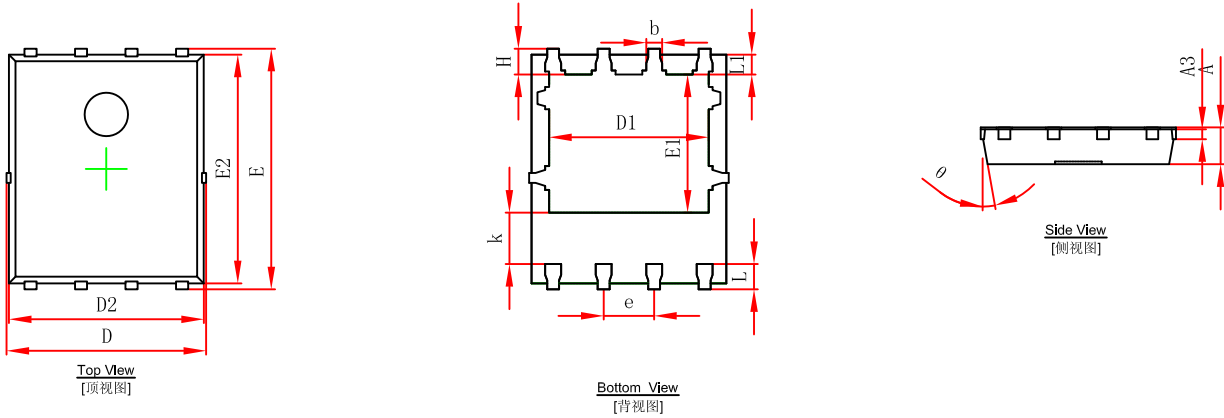


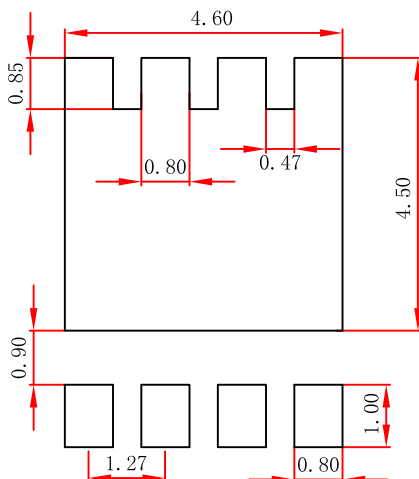
Figure 11 Normalized Maximum Transient Thermal Impedance

PDFNWB5x6-8L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

PDFNWB5x6-8L Suggested Pad Layout



- Note:
1. Controlling dimension: in millimeters.
  2. General tolerance:  $\pm 0.05\text{mm}$ .
  3. The pad layout is for reference purposes only.